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SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE



JANUARY 13, 1934

Proving That He Can See

See Page 27

A

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The Weekly  Current
Summary of Science

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Edited by WATSON DAVIS

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DO YOU KNOW?

Coffee is a native plant of Abyssinia.

True squashes and pumpkins will not cross when grown side by side.

Counting up its weed pests, California finds almost 300 species that are importations from other places.

The number of children born in the United States in 1933 is estimated at about 600,000 fewer than in 1921.

The weasel dons its snowy white coat for winter only in cold regions; in southern regions it remains brown.

Of all the world's cities of 100,000 or more people, seven out of ten are located on the water, and 34 per cent, are on the sea coast.

Xylose syrup made from corncobs and stalks has almost no food value and apparently does not have the bad effect on diabetics that ordinary sugar has.

Factories of the world produced seven times as much rayon as silk in 1933.

There are moths in the American tropics which measure almost a foot in wing spread.

A steamboat invented by a Spanish seaman in 1543 had a speed of three miles an hour.

Scientists have developed an instrument to show the amount of gloss and curl on karakul-sheep skins.

Reports on school conditions in over 600 cities show that in 74 cities home-making classes have been dropped.

Cotton and linen textiles do not usually shrink after the third laundering, and most shrinkage occurs in the first washing.

An Iowa man who found that his house stood over an underground cave ingeniously pipes the cool air from the cave into his house in summer.

WITH THE SCIENCES THIS WEEK

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ZOOLOGY

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These curiosity-arousing questions show at a glance the wide field of scientific activity from which this week's news comes. Book references in italic type are not sources of information for the article, but are references for further reading. Books cited can be supplied by Book Department, Science News Letter, at publishers' prices, prepaid in the United States.

MEDICINE

Recovery From Anesthesia Hastened By Acid Injection

Palinaesthesia, Method of Reversing Effect of Anesthetics, Found Successful in Harvard Tests

A MEANS of quickly reversing the deep unconsciousness caused by ether and other anesthetics and, in some cases, of bringing back from the brink of death overanesthetized patients, was announced to the American Association for the Advancement of Science by Dr. Walter V. MacGillivray, a dental surgeon of the Harvard dental school, after experiments in which the Harvard medical and dental faculties have cooperated.

A "shot" of weak hydrochloric acid injected directly into the blood is the agent that has been found effective in recalling and restoring to sensibility patients who would otherwise sleep for hours, and in some cases would never awake.

Followed Wrong Theory

While Harvard scientists have demonstrated the effectiveness of this new medical method, it was a young woman technician in a medical laboratory in Joplin, Mo., who, by following what is now believed to be a wrong theory, actually discovered the method. Miss Pearl L. Moorman, in an effort to save an animal with which she was working, introduced a minute dose of acid into its blood and found that it awoke from anesthesia.

She wrote Dr. MacGillivray an account of her discovery, and both he and a Kansas City medical laboratory verified her results, although her theory that anesthesia makes the blood more alkaline and that therefore acid would reverse the process has not been substantiated.

For Many Shocks

This acid method of terminating anesthesia has been christened "palinaesthesia," the name having been selected with the blessing of the Eliot professor of Greek at Harvard, Prof. Charles B. Gulick. A rough English equivalent is "renewed feeling."

Because extreme alcoholic intoxication, asphyxiation, near drowning, severe electric and other shocks are very similar to the purposely induced

anesthetic states caused by ether and other drugs, Dr. MacGillivray believes that injections of weak hydrochloric acid will prove effective in rescuing and bringing back to full use of the faculties, those who suffer from such difficulties. Palinaesthesia has not yet been tried on an extremely intoxicated person simply because Dr. MacGillivray has not yet had such a case made available to him.

"Annoying Wakefulness"

The first use of palinaesthesia on a human being was made by Dr. MacGillivray and Dr. Alfred Ellison, then resident surgeon at the Worcester Memorial hospital, last July. It was a real emergency. A patient had had an unusual reaction to avertin and following an operation he was plainly in a dying condition. As a heroic measure, Dr. MacGillivray, using the experience of successful experiments on rabbits, injected a weak solution of hydrochloric acid in the patient's veins.

There was an immediate improvement with the first few drops that en-

tered the blood, and forty minutes after the first injection, the patient, who had been so near death, was actually awake and answering questions. That night he complained of annoying wakefulness.

Seven more times palinaesthesia has been used on human patients, each time with striking results. Now the doctors are ready to suggest its use not only in emergencies to save life that might be taken by unusual effects of anesthetics, but as a routine method of awakening patients early after operations.

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MEDICINE

Palinaesthesia Finding Described by Discoverer

An auburn-haired, gray-eyed young nurse-technician of Joplin, Mo., is the discoverer of palinaesthesia, the method of quickly reversing the anesthetic state. She is Pearl L. Moorman, age 34, who is in charge of the Duncan Medical Laboratory in Joplin and supervises the laboratories of the city's health department and Freeman hospital.

Miss Moorman's statement, made at the request of Science Service, follows:

By MISS PEARL L. MOORMAN

I MADE the discovery of recall from anesthesia by intravenous injection of hydrochloric acid while trying to obviate the high death rate of anesthetized guinea pigs used in scientific work.

In approximately three hundred animals anesthetized only three have been lost and these probably died because of the fact that I had used them for four or five experiments in a single day.



SEARCHLIGHTS ON PARADE

One hundred and four 60-inch diameter anti-aircraft searchlights are being built for the U. S. Army by the Sperry Gyroscope Co. with \$2,015,900 of PWA funds. Improvement in design of the electric arc light source and of the reflector curve make these lights the Army's most powerful. Each will throw a beam of about 800,000,000 candlepower, visible 100 miles.

Demonstrations of the method have been given before the Jasper County Medical Society, a group of physicians at the Missouri State Medical Society, and before many other groups of physicians.

In making the original experiments I was following a theory of Dr. J. S. Haldane, the British physiologist, and Prof. Yandell Henderson of Yale. I asked myself what should be done when respiration ceased and the usual methods of resuscitation failed. I conceived the idea of an intravenous respiratory stimulant in the case where respiration has ceased and the heart beat was still present. The idea was based on the fact that hydrochloric acid when combined with carbonates produces carbon dioxide gas and that the blood of animals in a state of asphyxia is prone to shift toward an alkaline state. I decided that hydrochloric acid administered intravenously would obtain this desired result. Experiment showed that it did. Such was the birth of my discovery.

Ionization May be Cause

The idea of the production of carbon dioxide and its action as a respiratory stimulant was my original idea, but because the reaction caused by the injected acid is too instantaneous, I abandoned this theory some time ago. I am now working on the theory of ionization.

Other acids than hydrochloric have been used in my subsequent experiments.

Use of hydrochloric acid in recall from anesthesia is now being experimented upon at the University of Kansas, Northwestern University and by the Ernest Bishof Company in New York.

Nurse and Technician

I am a trained nurse and registered technician. I was graduated from the Duncan School of Technology at Kansas City, Mo., and I was a special student in chemistry at the Junior College in Kansas City. My other chemical education was self-obtained. Born in Monett, Mo., of poor parents, I was unable to pursue a higher education in college. I stole what chemical knowledge I could from contact with chemists and from books that I could buy or borrow.

My ambition is a position in a research laboratory where I can have the facilities to test further theories I have for the advancement of scientific medicine.

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ASTRONOMY

Universe Not Expanding in Our Part of Cosmos, Shapley Says

WHILE the universe as a whole may be expanding, as recent astronomical theory contends, the portion of the universe closest to man and the earth, extending for millions upon millions of miles out into space as far as the famous Clouds of Magellan and the Andromeda nebula, is not expanding. This is the conclusion Dr. Harlow Shapley, director of the Harvard Observatory, announced when he was presented the Rumford Medal of the American Academy of Arts and Sciences.

Dr. Shapley has studied intensively the region of the cosmos relatively close to us and he finds that there is a local supergalaxy, a sort of universe within a universe, consisting of our own Milky Way system, the two clouds of Magellan, the Andromeda nebula and two companions, and two other external galaxies. This supergalaxy seems to behave as a single unit and it does not show the expansive nature attributed to the universe as a whole by the theory of Abbé Georges Lemaître, the Belgian priest-cosmologist.

Doubled in Size

Dr. Shapley's study has doubled the previous estimate of the size of the Large Magellanic Cloud, which is the nearest of the external galaxies. It is a spectacle of the southern latitude skies and bears the name of the famous world explorer. The dimensions heretofore accepted have been doubled, and Dr. Shapley rates the Large Cloud as not less than twenty thousand light years in diameter. This makes it larger than the average external galaxy, but it is still much smaller than our own system and the great Andromeda nebula.

Using photographs made at the Harvard Observatory's southern station in the Orange Free State of South Africa, Dr. Shapley has found that there are several millions of giant and supergiant stars that are of higher candle power than our own sun, some of them ten thousand times as bright.

A gigantic mingling of our own Milky Way galaxy with the Large Magellanic Cloud some time in the past, many, many thousands of years ago, may have occurred, Dr. Shapley surmises

from irregularities in the cloud. He finds an intimation in the arrangement of newly found star clusters in the cloud that it is a deformed or broken-up spiral, and he believes that the disfiguring may have been caused by the passage of the cloud through our Milky Way at a remote past time.

Five hundred new variable stars, found among the giants and supergiants of the Large Magellanic Cloud, bring the total to thirteen hundred and fifty. These are the famous Cepheid variables that astronomers can use as yardsticks of the heavens. They allow Dr. Shapley to estimate that the Large Cloud is so distant that it takes speedy light ninety thousand years to travel from it to earth.

600 Nebulae Found

One of the last Harvard Observatory discoveries of 1933 was reported by Dr. Shapley. He said that six hundred galactic nebulae, great masses of stars similar to our own Milky Way, have been found in a region where only sixteen were known hitherto. This accomplishment was made with the aid of one of the Observatory's new telescopes.

The bit of the heavens thus given nearly a forty-fold increase in its known population of galaxies is an area about equal in size to the bowl of the Great Dipper and lying between that constellation and the Lynx.

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ARCHAEOLOGY

Queen Jezebel's Ivories Divided Three Ways

BROKEN pieces of carved ivory, all that is left of the extravagances and splendors of wicked Queen Jezebel of Bible fame, have been divided three ways among museums in Palestine, England, and the United States. Twenty fragments of the palace ivories have just come to the Fogg Art Museum at Harvard University, Prof. Kirsopp Lake, of Harvard, announced.

The carvings reveal visibly for the first time the meanings of Bible lines, describing the "ivory house" belonging



FROM THE "IVORY HOUSE"

A drooping palm, one of the twenty fragments of ivory carvings from Queen Jezebel's palace in Samaria, now acquired by the Fogg Art Museum of Harvard.

to King Ahab and his Queen Jezebel, at Samaria. Existence of the ivory house of the royal pair has often been questioned, until the recent discovery of the ivory fragments by an expedition, of which Prof. Lake was a member.

The excavations show that Ahab's palace stood on top of the hill of Samaria, in a great open court extending over some seven or eight acres. Massive walls surrounded this court, and the ivory art pieces were found just inside the north wall. Several thousand fragments were recovered, but many were blackened by fire.

The ivory pieces are believed to have adorned the throne, tables, couches, and cabinets of the palace, and possibly also the wall panels. Nearly forty pieces are in excellent preservation. From these, archaeologists deduce that King Ahab imported much of his palace art from Egypt. Many of the figures depicted are from Egyptian mythology, and the decorative motives feature the Egyptian lotus and drooping palm. Plainer, less skilfully carved ivories suggest local Samarian workmanship.

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PUBLIC HEALTH

Country's Lowest Death Rate Reported by Surgeon General

Institute of Health Chemists Learn More About Sugar; Radium Dial Painting Still a Menace

THE DEATH rate for this country for the calendar year 1932 was the lowest ever recorded, Surgeon General Hugh S. Cumming, U. S. Public Health Service, stated recently. The statement was contained in the Surgeon General's annual report to Congress which covers the activities of the Service for the fiscal year ending July, 1933.

Unusually favorable health conditions prevailed during the first half of 1933 and the indications are that the whole year just ended will also prove to have been an unusually healthy one. Preliminary reports from large cities of the country for 1933 indicate a still lower death rate than before recorded, being less than 12 per 100,000 population.

Mitogenetic Ray Proof Lacking

Mitogenetic rays, those mysterious and supposedly potent rays said to emanate from roots of growing plants and yeast cultures, may exist but physical proof of their existence is lacking, it appears from the report.

At the Service's office of field investigations of cancer, under the charge of Dr. J. W. Schereschewsky at Boston, studies designed to demonstrate by physical means the presence or absence of these rays were carried out, using the Geiger radiation counter, an apparatus for detecting and measuring extremely small quantities of radiation. The sensitivity of this apparatus was determined in absolute units and was found to be at least six times as great as necessary to respond to radiation of the intensity assigned to mitogenetic radiation. Even with this very sensitive detector no rays could be detected from any of the various substances said to be active radiators of mitogenetic rays.

No More Mouth Pointing

Radium dial painting still threatens the health of the workers in the industry, according to the report.

The health hazard of this occupation was not entirely eliminated when the habit of pointing the radium paint

brushes with the mouth was stopped, Dr. R. R. Sayers and associates of the federal health service found. Their examinations showed that there is a slight accumulation of radium in the bodies of workers who have been employed since January 1, 1927, that is, under present conditions with mouth pointing eliminated.

Dust in the air of the workrooms was found to be radioactive to a degree sufficient to account for the radium accumulation in the bodies of the employees. The federal health experts recommended that the dissemination of dust in the workrooms should be prevented by extreme cleanliness in the factory. In addition, personal cleanliness of employees and adequate ventilation, both local and general, were urged.

Chemical Views Upset

Current chemical views as to the composition of sucrose, the common sugar of our kitchen shelves, dining tables and candy shops, have been unsettled by discoveries of Prof. Claude S. Hudson and associates of the U. S. National Institute of Health, briefly described in the Surgeon General's report.

These studies of the veteran sugar chemist raise the important question of whether the present view of how this sugar is decomposed in our bodies by the digestive ferment, invertase, is correct. The new ideas about sugar resulted from the isolation in pure crystalline form of a new, very reactive substance, a gamma methyl fructoside, derived from fructose, the sugar of fruits. The new substance could not be decomposed by invertase.

Prof. Hudson and associates were investigating the way in which invertase, digestive ferment present in the digestive tract and in yeast, splits sucrose into glucose and fructose. Their studies made it clear that this mechanism of the inversion of sucrose by invertase is essentially concerned with the fructose portion of the molecule.

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PLANT PHYSIOLOGY

Water in Plants Ascends As Vapor, New Theory Holds

WATER flows uphill in plants through the many thousands of tiny tubes that make up the woody parts of the stems, but it does not flow as water does in the plumbing pipes of a house. It does not go up in solid streams, at least in times of water scarcity, but forms films that stick to the walls of the tubes and flow along them, with hollow spaces in the middle filled with water vapor.

This hypothesis of sap ascent in plants, radically differing from all doctrines accepted by botanists for many years, was laid before the Botanical Society of America at its meeting in Boston, by its retiring president, Prof. George J. Peirce of Stanford University.

Present Theory

The theory of sap ascent most commonly held today is that the water in the microscopic tubules of the plant, because of the very small diameter of its columns, has a strength like that of fine wires, and that the pull exerted upon these columns by the evaporation taking place in the leaves literally drags the water upward through the stem as though the "wires" were made of some solid stuff instead of a thin liquid. This theory took its present form about twenty years ago, and has been accepted by practically all plant physiologists.

With all this Prof. Peirce disagrees. He has performed delicate physical and chemical experiments with plants near the wilting point which indicate that water in the liquid form exists only in contact with the cell walls. The hollow space within these water cylinders, he stated, is filled with water vapor, which in this form can move through the plant much faster than water molecules can travel when they are parts of a continuous water mass. Only at times of water surplus, said Prof. Peirce, are the tubes filled with continuous columns of liquid water.

Prof. Peirce's theory does not picture the water entering the plant in the simple mechanical way postulated by the "orthodox" doctrine of present-day botany. The living protoplasm in the roots, he said, "conditions" its entry, speed-

ing it up under some circumstances and slowing it down under others. Thus, when the soil is warming up in the spring, the water vessels of trees will be gorged with sap; but when the soil is getting cold in autumn a dearth of water will take place in the tree even though the soil about its roots is not dried up.

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GENERAL SCIENCE

A.A.A.S. Declares For Intellectual Freedom

A FIRM, outspoken protest upon such inroads upon intellectual independence as are being made in Germany and other parts of the world today was one of the most important results of the meeting of the American Association for the Advancement of Science at Boston.

The resolution adopted by this principal organization of the nation's scientists will also be read with significance in some parts of our country where with less openness and without a flying of banners of oppression damaging cur-

tailments of intellectual freedom have been made.

Headed "A Declaration On Intellectual Freedom," the pronouncement reads:

"The American Association for the Advancement of Science feels grave concern over persistent and threatening inroads upon intellectual freedom which have been made in recent times in many parts of the world.

"Our existing liberties have been won through ages of struggle and at enormous costs. If these are lost or seriously impaired there can be no hope of continued progress in science, of justice in government, of international or domestic peace, or even of lasting material well-being.

"We regard the suppression of independent thought and of its free expression as a major crime against civilization itself. Yet oppression of this sort has been inflicted upon investigators, scholars, teachers and professional men in many ways, whether by governmental action, administrative coercion, or extra-legal violence. We feel it our duty to denounce all such actions as intolerable forms of tyranny.

"There can be no compromise on this issue for even the commonwealth of learning cannot endure 'half slave and half free.'

"By our life and training as scientists and by our heritage as Americans we must stand for freedom."

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PUBLIC HEALTH

Health Experts Differ On Effects of Depression

THE POSSIBLE effects of the continued depression on the health of the country's population was closely watched during the past year. Reports and opinions of health experts were conflicting, however.

Metropolitan Life Insurance Co. statisticians found from a study of deathrates that wage earners of the United States and Canada remained remarkably healthy.

Surveys conducted jointly in large cities by the U. S. Public Health Service and the Milbank Memorial Fund showed that victims of the depression who have become impoverished since 1929 have had much more sickness than the "chronically poor" or than families whose heads were full-time wage earners.

Weights of American school children have

not been materially affected by the depression, a U. S. Public Health Service survey indicated.

One-fifth of all the children in the country are showing the effects of the depression, the U. S. Children's Bureau estimated.

Depression diets do not lack vitamin A, as evidenced by no increase in cases of eye diseases resulting from this deficiency, the late Dr. Alfred F. Hess and Dr. Daniel B. Kirby of New York City found on formal inquiry among leading eye specialists of the country.

The deathrate from diabetes, despite the fact that it is associated with over-nutrition and obesity, has not declined as a result of the depression, Drs. Elliott P. Joslin, Boston, and Herbert H. Marks and Louis I. Dublin, Metropolitan Life Insurance Co. statisticians, found.

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GENERAL SCIENCE

Science Must Heal Wounds Made by Applied Science

Dr. John Dewey At Dinner Honoring Dr. Cattell Urges Science Extension as Supreme Intellectual Obligation

By Dr. JOHN DEWEY, Professor Emeritus of Philosophy, Columbia University.

EDITOR'S NOTE: Several hundred friends of Dr. J. McKeen Cattell, the psychologist, president of Science Service, and editor of *Science*, *Scientific Monthly*, etc. tendered him a dinner of honor during the Boston meeting of the American Association for the Advancement of Science.

The following are excerpts from Dr. Dewey's address on that occasion.

THE SCIENTIFIC worker faces a dilemma. The nature of his calling necessitates a very considerable remoteness from immediate social activities and interests. It is absorbing in its demands upon time, energy and thought. As men were told to enter their closets to pray, so the scientific man has to enter the relative seclusion of the laboratory, museum and study. He has, as it is, more than enough distractions to contend with, especially if, as so often happens, he is also a teacher and has administrative and committee duties. Moreover, the field of knowledge cannot be attacked en masse. It must be broken up into problems; and as a rule, detailed aspects and phases of these problems must be discriminated into still lesser elements. A certain degree of specialization is a necessity of scientific advance. With every increase of specialization, remoteness from common and public affairs also increases. Division of labor is as much a necessity of investigation into the secrets of nature and of man as it is of industry.

"Unknown Tongue"

Nor does aloofness reach an end at this point. The language in use for common communication does not fit the statement of scientific inquiries and results. It was developed for other purposes than that of accurate and precise exposition of science, and is totally unfitted to set forth comprehensive generalizations in exact form. The result is that the scientist speaks what for the mass of men is an unknown tongue, one which requires much more training

to acquire than any living speech or than any dead language. He can speak about his own direct affairs and problems only to a comparatively small circle of the initiated.

These considerations form and define one horn of the dilemma. The other horn is constituted by the fact that the scientist lives in the same world with others, and that world is being made over by the fruits of his labors. There is hardly a single detail of our common and collective life, whether in transportation of persons and goods, in modes of communication, in household appliances and conveniences, or in agriculture and all the varied forms of productive industry, that is not what it is today because of what science has discovered. The scientist may be aloof in his work and language. The results of his work pervade and permeate, they determine, every aspect of social life. The inventor, the engineer and the business man are unremittingly occupied with translating what is discovered in the laboratory into applications of utensil, device, tool and machine, which have largely revolutionized the conduct of life in the home, the farm, and in amusements as well as in industry. . . .

Science Restrained

It is a commonplace that mankind in advanced industrial countries and especially in the United States confronts the paradox of want in the midst of plenty. It is science, which through technological applications has produced the potentiality of plenty, of ease and security, for all, while lagging legal and political institutions, unaffected as yet by any advance of science into their domain, explain the want, insecurity and suffering that are the other term of the paradox. . . .

The demands of the situation cannot be met, as some reactionaries urge, by going backward in science; by putting restrictions upon its productive activities. They cannot be met by putting a gloss of humanistic culture over the brute realities of the situation. They can



WINNER OF \$1,000

Prof. Reuben L. Kahn of the University of Michigan who won the \$1,000 prize for a notable paper delivered before the American Association for the Advancement of Science in Boston. Prof. Kahn's paper, describing his discovery of the fact that when an animal is immunized its body tissues acquire protective properties as well as the blood, was reported in last week's *Science News Letter* (Jan. 6, '34, p. 3).

be met only by human activity exercised in humane directions. The wounds made by applications of science can be healed only by a further extension of applications of knowledge and intelligence, and like the purpose of all modern healing the application must be preventive as well as curative. This is the supreme obligation of intellectual activity at the present time. The consequences of science in life impose a corresponding obligation. . . .

There probably was never a time in the history of the world when power to think with respect to the conduct of social affairs and the remaking of traditional institutions was as important as it is in our own country today. There is an immense amount of knowledge available, knowledge economic, historical, psychological, as well as physical. The chief difficulty lies not in lack of information that might be brought to bear, experimentally, upon our problems. It lies on the one hand in the fact that this knowledge is laid away in cold-storage for safe-keeping; and on the other hand, in the fact that the public is not habituated to a desire for the knowledge nor to be. (Turn to Page 30.)

BIOLOGY

Underfed Animals Have Longer Lives

FULL feeding means shorter life. If you would have many days upon the earth, be abstemious.

This would seem to be the conclusion to be drawn from experiments on laboratory animals, reported to the American Association for the Advancement of Science by Dr. Clive M. McCay and Miss Mary F. Crowell of Cornell University.

Dr. McCay and Miss Crowell used 106 rats in their research. They divided the animals into approximately equal groups. All were fed diets qualitatively complete.

"Two groups were retarded in growth by inadequate calories only, while the third group matured rapidly with ample calories," the experimenters reported. "This experiment is in progress and in its fourth year but the results are conclusive in showing that the animals that mature slowly have a much greater life span than the rapidly growing ones."

"This extension of the life span by means of retarded growth indicates that the potential life span for a given species is much longer than has been anticipated. Furthermore these data suggest that the longer life span of the female may be related to the slower growth rate of the female sex as the animal approaches maturity."

Science News Letter, January 13, 1934

ENTOMOLOGY

Persecuted Cockroach Serves Vitamin Testers

FOUND: a use for the cockroach.

This humble hunted insect, millionfold victim of brooms, poisons and scalding water wherever he shows his persecuted head, was recommended as a sensitive living test-tube for vitamins, in place of the bigger, more expensive and heartier-eating laboratory animals such as mice and rats, by Dr. Clive M. McCay of Cornell University.

Insects, Dr. McCay pointed out, can be kept in larger numbers in a given laboratory space than can any other animal, and because they eat so little they can be used in "micro-tests" where the amount of vitamin or other substance to be tested is very small. And since the cockroach is as omnivorous as a rat or a man, and thrives perfectly

under ordinary house or laboratory conditions, it makes an almost ideal test animal.

Dr. McCay's first feeding experiments with these scuttling insects showed the older ideas, that insects do not need vitamins, to be incorrect. Other experiments have shown what some of the normal vitamin requirements of the cockroach are.

"Archie" has been admitted to the best scientific circles. We may now expect at least an ode from him on the subject.

Science News Letter, January 13, 1934

METEOROLOGY

Los Angeles Was Far From Center of Storm

THE CENTER of the meteorological disturbance which caused such flood havoc in Los Angeles was far to the north of that city in the region of Alaska, Charles L. Mitchell, forecaster of the U. S. Weather Bureau, told Science Service.

The most unusual downfall of rain, which was far greater than the previous record for that part of the country, was caused by unusual local atmospheric conditions. Exactly what these were cannot be known until data are gathered, from airplane observations or otherwise, throwing more light on the upper air conditions.

It is known that the moisture in the air was great and that some condition, perhaps the convergence of air currents, caused the air to rise. As it was forced upward, the air was cooled by expansion causing the previously invisible moisture to form into clouds and rain drops—in this case plenty of drops.

During one 12-hour period the rainfall amounted to about 3 inches and during the next 12-hour period it reached about 4 inches, totalling more than 7 inches in the 24 hours. The previous record for Los Angeles, set in February, 1913, was 5.12 inches.

The rainfall was not what is technically called a cloudburst, however. A cloudburst is a sudden extremely heavy downpour, amounting perhaps to a rate of several inches of precipitation an hour, and producing a veritable wall of water.

A remarkable feature of the California storm is that there was so little rain in San Diego, a relatively short distance from Los Angeles, and other nearby points.

Science News Letter, January 13, 1934

IN SCIENCE

BOTANY

Jimsonweed Seeds Sometimes Sprout Twins

WEEEDS are notorious for the rapid rate at which they multiply. Sometimes they have twins.

Jimsonweed, one of the rankest of all familiar but undesired plants, have an exceptionally high germination rate, Miss Sophia Satina told the Genetics Society of America. Working with Dr. A. F. Blakeslee and A. G. Avery of the Carnegie Institution of Washington at the station for experimental evolution at Cold Spring Harbor, N. Y., she found that germination tests with this plant sometimes yielded more seedlings than there were seeds.

This apparent paradox is resolved by the fact that some of the seeds are twins—two infant plants folded up inside a seed-coat instead of the usual one.

Science News Letter, January 13, 1934

PHYSICS

Intense Sounds Curdle Proteins

TO DESCRIBE an intense sound as "blood-curdling" has more basis in scientific fact than has been known until recently.

Sounds well within the audible range, if they are intense enough, will produce a chemical change in various substances, Drs. Earl W. Flosdorf and Leslie A. Chambers, of the University of Pennsylvania School of Medicine, have found.

An egg was coagulated as though soft boiled by these audible sounds. Ethyl acetate was broken down to produce acetic acid, vegetable oils were "cracked" with the generation of acetylene gas, and starch was to a slight extent decomposed to produce glucose. The sound vibrations used ranged in frequency from 1,000, about two octaves above the middle C on the piano, to 15,000, a very shrill squeak.

This article corrects an item in the science review of the year for 1933. (See SNL, Dec. 23, '33, p. 408, and June 24, '33, p. 395.)

Science News Letter, January 13, 1934

SCIENCE FIELDS

BIOCHEMISTRY

Dilute "Heavy Water" Not Poisonous to Yeast

YEAST cells thrive on "heavy water" if it is dilute enough, Dr. Oscar W. Richards of Yale University found in experiments reported before the meeting of the Botanical Society of America. This is not in agreement with earlier experiments by other scientists, who found that "heavy water" is poisonous to tadpoles, guppy fish, and worms. However, the disagreement may be only on the surface, for many poisons are tonics when they are taken in minute doses.

The "heavy water," containing enough double-weight hydrogen atoms (deuterium) to give it a specific gravity of 1.000061, instead of the 1.0 of ordinary water, produced no difference between number of yeast cells per unit volume in cultures grown in this dilute solution and in ordinary water. The number of actively budding cells was also about the same in both cultures.

The total volume of cells was 20 per cent. greater in the dilute "heavy-water" solution, although the mean cell size was only 3 per cent. greater. The dry weight was 26 per cent. greater in the "heavy-water" culture, and the cells were more uniform in size.

Science News Letter, January 13, 1934

ARCHAEOLOGY

To Speed Rescue Of Tennessee Ruins

IN A HOT race with time, archaeologists are speeding arrangements to rescue Indian mounds and villages in the danger path of Tennessee Valley Authority constructions. Land which will be flooded as the building of dams proceeds, is pronounced by archaeologists rich in remains of American prehistory which should be examined before they are lost under water.

The National Research Council has received funds to aid the project and, with additional aid from the CWA in funds and labor for excavations, the rescue of the Indian remains is begun.

Prof. W. S. Webb of the University of Kentucky has taken charge.

Following a visit to the region, Neil M. Judd, Curator of Archaeology of the U. S. National Museum, stressed the need for haste if science is to study this part of America's ancient buried record.

Wheeler Dam above Muscle Shoals in Alabama is now under construction, and will be completed within eighteen months. Through the aid of a grant from the National Research Council, eighty miles of this area along the river have already been surveyed archaeologically by Dr. W. B. Jones of the University of Alabama, state geologist. In this survey Dr. Jones found over 300 mounds and village sites marking places where Indian history might be studied.

The archaeological problem in the Tennessee Valley is larger than has been anticipated, Mr. Judd said. Even though the winter months are the worst of the year for archaeological digging, it will be necessary to set to work, he reported, if the buried history of the region is to be, even in a measure, recovered.

Science News Letter, January 13, 1934

ELECTRONICS—BOTANY

"Electric Eye" Built To Tell Area of Leaves

THE PHOTOELECTRIC cell, or "electric eye," had a new role added to its already long list of versatilityes at the meeting of the American Society of Plant Physiologists by R. B. Withrow of Purdue University. He uses it to measure the area of leaves, which is a datum of considerable importance in estimating the efficiency of various plants in the capturing of sunlight for the manufacture of food. Methods hitherto in use have been exceedingly tedious and time-consuming; but the adaptable "electric eye" does the job literally at a glance.

The apparatus is very simple. The photoelectric cell is put inside a box. Over it is placed a ground glass plate. Above the plate is a circle of twelve 100-watt frosted electric lamps.

When the lamps are turned on, the cell responds to their stimulus and generates a current which is read with a suitable instrument. Then the leaves to be measured are laid on the glass, cutting off part of the light. The response of the cell is diminished in proportion to the amount of light cut off, and therefore also in proportion to the area of the leaves causing this eclipse.

Science News Letter, January 13, 1934

LINGUISTICS

New England Speech Studied For Atlas

PROGRESS in preparing a linguistic atlas of the United States and Canada was reported before the American Association for the Advancement of Science at Boston.

Features of New England dialects have been collected, and maps showing how a given item of speech is distributed geographically are now being made. Most of the maps will be ready for publication in a year and a half, Prof. Hans Kurath of Brown University, reported.

Eventually the mapping of speech will be extended to include all the territory settled by 1850. There will be about 800 maps.

The maps show local forms of speech dealing with the weather, the dwellings, farms buildings, calls to animals, foods and their preparation, diseases, and other everyday matters.

In a number of the New England speech items that have been analyzed, the influence of the original colonies is still in evidence, Prof. Kurath has found. The spread of the early population from Massachusetts up the Merrimac Valley, and the expansion from river towns on the Connecticut and from western Connecticut to the Berkshires and up into Vermont, are reflected rather clearly in the distribution of many speech features.

In some areas secluded until recent times there are archaic speech forms preserved, showing a lack of avenues of communication.

Science News Letter, January 13, 1934

SEISMOLOGY

Northeast Asia Feels Strong Earthquake

THE VICINITY of Kamtchatka peninsula in northeast Asia was the center of a deep-seated strong earthquake shock that was recorded early Wednesday morning, Jan. 3, on seismographs throughout the world. Although this shock was a world-shaker, due to the uninhabited nature of the region it is probable that no material damage or loss of life was caused.

The exact time of the shock was 4:42 a. m., EST, Jan. 3, and the approximate epicenter was 53 degrees north latitude and 155 degrees east longitude.

Science News Letter, January 13, 1934

PHYSICS

What Weight Has Neutron? Is Moot Question of Physics

NEURON, how much do you weigh?

Physicists are asking that question about the fundamental particle of matter that a relatively few months ago was totally unknown.

The present status of the neutron mass controversy was summarized recently by Dr. R. M. Langer of the California Institute of Technology.

All agree it is almost equal to the hydrogen atom which is 1.0078 on the chemical scale, but it is most important to know whether the neutron is heavier or lighter and by how much. Small differences in mass make big differences in most other things.

The French workers, Dr. F. Joliot and his brilliant wife, the daughter of Mme. Curie, assert the neutron is heavier than hydrogen and equal to 1.012. This explains how protons break up into neutrons and positive electrons, and why the beryllium nucleus is stable. But Dr. Langer pointed out that these assertions are not yet to be accepted as facts and depend on questionable interpretations of experiments.

The English physicist, Dr. J. Chadwick, who discovered the neutron with the aid of preliminary work by the Jolios, chooses the mass 1.0067, which is slightly lighter than hydrogen. His interpretations are well established but the experiments are not very accurate. Dr. Langer believes this value is close but not necessarily exactly right.

A third group, represented by Prof. E. O. Lawrence at the University of California, insists that the neutron is considerably lighter, namely 1.0006. This is claimed because some of their experiments seem to show that the deuteron is unstable and breaks up when it strikes other nuclei. Dr. Langer holds that it must yet be proved that there are no more probable interpretations of their work.

Dr. Langer contends that by far the most precise means of determining the neutron's mass is to use experiments on the disintegration of lithium with deuterons. This process has been carefully studied by Lord Rutherford, Dr. M. L. E. Oliphant and Dr. B. B. Kinsey in England. The scientists measured the

energy of the helium found in the disintegration. From their data, Dr. Langer calculated that the mass of the neutron is 1.0062, which is only 0.0005 less than Dr. Chadwick's guess. This small difference is, however, equivalent to half a million volts.

The mass 1.0062 would mean that the deuteron is stable but would be easily decomposed while the proton might very readily break up into a neutron and a positive electron. Until this question of the neutron's mass is decided, Dr. Langer contended, little progress can be made with the theory of the nucleus.

Science News Letter, January 13, 1934

ENGINEERING

Wet Asphalt Road Not Cause of Most Skidding

WET ASPHALT and tar macadam do not cause skidding as much as other wet road surfaces, despite popular opinion, Prof. R. A. Moyer of the Iowa State College Highway Engineering Department announced as the result of a two-year research of skidding, reported to the Highway Research Board.

The "sand-paper" finish of sheet asphalt, rock asphalt, and asphaltic concrete surfaces was partly responsible for their high resistance to skidding, it was found. Motorists have much more chance of skidding on the so-called "non-skid" surfaces, than on rock asphalt with a "sand-paper" finish, the tests showed.

Tire chains increased the resistance of sleet-covered surfaces to skidding straight ahead but reduced the resistance to skidding sideways. A fairly definite decrease in the tendency to skid was observed with a decrease in temperature. The hot spot on the tire which developed at the higher speeds when sliding straight ahead was found to be more conducive to this kind of skidding in warm weather than in cold weather.

The relative resistance to skidding for the wet surfaces tested, starting with the highest resistance, were as follows: high type asphaltic pavements, tar macadam, asphalt retread and oiled gravel, untreated gravel, portland

cement concrete, mineral surfaced asphalt plank, brick, asphalt penetration macadam with soft seal coat, fine aggregate type asphalt plank, steel traffic plates, hard wood plank, mud on any hard surface, snow, sleet, and ice-covered surfaces.

The skidding propensities of wet portland cement concrete surfaces were found to be 15 to 40 per cent. higher than for the wet high type asphalt pavements. The results for the concrete surfaces were remarkably consistent.

Science News Letter, January 13, 1934

PSYCHIATRY

Weight-Reducing Drug Tested on Mental Cases

THE SAME powerful drug, dinitrophenol, that has been used for reducing weight of over-weight persons may prove of some use in the treatment of the serious mental disorder known as schizophrenia or dementia precox. Drs. J. M. Looney and R. G. Hoskins of the Memorial Foundation for Neuro-Endocrine Research, Worcester State Hospital, Mass., reported to the American Association for the Advancement of Science experiments in which small doses of the drug were administered to the mentally deranged patients.

The rate of using food energy in this disease is ten to fifteen per cent. lower than in normal individuals. Dinitrophenol increases the rate of energy consumption, and the physicians are hopeful that further experiments may show the drug to be practically useful in allaying the mental symptoms by increasing the physical functions of the sufferers.

The drug is considered dangerous to use without very close medical care.

Science News Letter, January 13, 1934

THE FELS PLANETARIUM OF THE FRANKLIN INSTITUTE

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an address by

James Stokley

Associate Director in Charge
of Astronomy, Franklin In-
stitute Museum

Wednesday, January 17, at
4:30 p. m., Eastern Stand-
ard Time, over Stations of
the Columbia Broadcasting
System. Each week a promi-
nent scientist speaks over
the Columbia System under
the auspices of Science
Service.

PSYCHOLOGY

Proving That Baby Can See

**It Has Been Thought That Newborn Babies are Blind,
But a Skeptical Scientist Has Upset This Theory**

By MARJORIE VAN DE WATER

"CAN HE SEE ME?"

This is often the first question asked by the young mother when she looks at the depths of solemn mystery in the eyes of her newborn baby.

The answer has heretofore always been "No."

Until now it has been generally thought that the young infant comes into this world as blind to its beauties as a young kitten. The experienced mother of a brood would tell you that he could not possibly see, because the bright colored bauble dangled before his eyes brought no response from the drowsy baby.

The anatomist would cite for you rules to prove that it would be physically impossible for the infant to see. The eye is not sufficiently developed at birth, he would say with an air of finality.

It remained for a skeptical psychologist, Dr. W. C. Beasley, of the Johns Hopkins University, to answer, "Well, suppose we examine the babies and test their eyesight. Let's forget all the rules and find out whether they do see."

As a result, he was rewarded by a surprising upset to theory. Babies' eyes can see!

The discovery was not made without overcoming some obstacles, however.

It is not possible to present the newborn with the customary visual acuity chart and ask him to read off those meaningless letters "E C D B Z," and other letters of the alphabet. He would merely blow bubbles at you and say, "Blah!"

Neither are his gropings for his mother any scientific evidence that he can see, for in this he may be guided by other senses—touch, temperature, or hearing, for example. And, indeed, he is so clumsy in his efforts that his blundering has been considered as demonstrating his lack of vision.

When displeased, the newborn screws both eyes tightly shut, apparently to leave more room for the mouth to open and emit wails. And when content, he

lies like a silent Buddha as though defying anyone to learn what is in the mind behind those eyes.

How would you go about testing the vision of the newborn?

Dr. Beasley's solution of the problem was as simple as the famous method Columbus devised for standing an egg on end—by crushing the end. It is a test that you can easily try for yourself. The psychologist made use of a little pocket flashlight—the sort that look like a fountain pen and are available at almost any corner store. Over the end of this he carefully wrapped three layers of tissue paper so that the tiny light should not be too strong for the sensitive eyes of the baby.

Eyes Follow Light

And then, when the baby was lying in the dark, Dr. Beasley flashed on the light. At first, there was disappointment. The infant paid no attention. Then the scientist moved the light slowly back and forth, nearer the infant's eyes and then away again, until finally, by watching the baby's eyes he could detect a fixation on the light.

Next, keeping the light at the same distance from the eyes of the infant, he slowly, gradually moved it in an arc across the child's field of vision. The baby's eyes followed!

When the light had moved past where the child's eyes could follow it, the baby turned his head!

There could no longer be doubt that the young infant can see a dim light in a dark room. For when he turns his head to follow a light, it must be because his eyes respond to it.

The next thing to find out was whether the newborn can see ordinary objects as well as a light. Of course it might be that this turn of the head toward the light is a sort of phototropic action not the same as normal vision.

Dr. Beasley's next test therefore followed the same procedure as before except that it was conducted in dim illumination and in place of the flashlight he now used just his fingers, fluttering them before the eyes of the baby. Again

the child not only followed the moving fingers with his eyes, but actually turned his head to watch them. So it is evident that he is not only responsive to light but can see objects. An additional test with a little rod, dark blue in color and just a little bigger around than the fountain-pen flashlight, brought the same results.

And the tests have been repeated by Dr. Beasley many times—altogether 829 tests were given to 109 different white babies, and over a thousand trials made with 142 dusky little mites from the Negro nursery. All were under twelve days old and some had been in this world but a scant two and a half hours.

Every single one passed the vision tests. Every one could see.

Nevertheless, a wide range of individual difference was found in the visual ability of the babies. Race differences were observed, too.

The experimental apparatus was carefully designed for the baby's comfort. Scientists experimenting with these little bits of humanity always take the greatest care to protect them against any possibility of danger or discomfort. This sort of test could be conducted only when the baby was awake and content. If he cried the experiment would have to be abandoned. If he dropped off to sleep, he was awakened by a light touch on the sole of the tiny foot—the way used by nurses who wish to wake the baby for dinner.

Looks at Mirror

The baby lies flat on his back in the crib-like cabinet and is taken back and forth from nursery to experimental room in it, riding smoothly on rubber tired casters. The object he is to look at is held directly over his face, so that he doesn't have to turn in any awkward positions to see. In tests using colored lights on a screen, the screen is placed at the foot of the crib, but the child views it in a mirror placed above his face.

The crib is so arranged that motion picture apparatus can be attached to it for making a permanent record of the eye movements of the baby, and there is also a mounting for a specially designed telescope used to magnify the tiny eyes.

This telescope has revealed interesting

things about babies' eyes that are new to science. The protective device nature provides for shielding the eye from painful intensities of light—a reflex contraction of the iris—is totally absent in many newborns. Some do not show it at all until they are a week old. All the babies improve in this response during their first two weeks. It is the weakness of this reflex that makes it advisable to keep the new baby away from daz-zlingly bright lights.

The ability to fixate both eyes on the same object is another which improves markedly during these first important days of life. If you are trying Dr. Beasley's tests on a young infant of your own acquaintance, move your pen or fingers patiently back and forth from a distance about six inches from baby's nose to fully 12 inches. Somewhere within this range he may be able to fix both eyes on it as early as his very first day. Do not be worried if he can't, though. Some infants can't do it until the second or third day—some not until toward the end of the second week.

Some fixate a single object with both eyes, but others do not. It is this lack of ability to fix both eyes on a given object that gives the young baby that occasional "cross-eyed" or "cock-eyed" look.

Another ability concerning which Dr. Beasley has accumulated new information is the power of the lens in each eye to adjust itself to the changing distances of an object from the eyes of the infant. Unless these lenses, one in each eye, are in focus for the object viewed, the impression which the person gets is one of a blurred object. Since the distance from the center of the lens to the retina of the eye is shorter in newborn infants, and since their lenses do not adjust readily to different distances, the newborn are "nearsighted."

Can a newborn baby notice the difference between a pink blanket and a blue one? Does he realize that the hue of either varies from that of his white pillow slip?

Dr. Beasley's experiments have paved the way for color-vision tests of the newborn and he hopes to give these tests to many infants during the coming year.

This is the test:

On a screen at the foot of the baby's experimental crib will be focused a round spot of colored light. The brightness of both the spot and the background can be varied at the will of the experimenter. Both will be reflected in a mirror placed at an angle

above the infant's head, and this mirror can be adjusted until the spot appears at just the right distance from the baby's eyes.

Now if the baby follows the movement of a cherry-colored spot as it dances about over a leaf-green background of similar brightness, this will demonstrate conclusively that that child is not colorblind to red and green. Since the colors can be varied at will, the child can be similarly tested for any type of colorblindness.

Following the spot is an absorbing game for the young baby, it has already been found in tests designed to measure his keenness of vision. In these tests the lights were not colored; the background of the screen was black and the spot was varied from quite a bright light to a spot so dark that it could not be distinguished from the background. A line of light has also been used for the same purpose.

The baby only a few hours old will follow the movements of a line only an eighth of an inch wide and only very slightly different in brightness from the background. Spots are followed even more readily than the lines.

Individual differences between different infants were very noticeable in all the various visual abilities, and soon it was suspected that those who were most advanced in this regard were the ones who for one reason or another were more fully developed at birth. Perhaps they had received better nourishment or some other advantage from their mothers. Individual infants differ tremendously in their physical development at birth.

Negro babies were found to be superior to the white infants in the vision tests, and they were also more fully developed physically at birth. One little dusky piccaninny even tried to crawl or squirm off the crib while the tests were in progress.

Science News Letter, January 13, 1934

In storing fruits and vegetables commercially, government scientists find that temperatures should be fairly constant, even variations of two or three degrees above or below the desired temperature being too large in most cases.

Singing in the bathroom is popular, explains one physicist, because the singer listens not merely to his own voice but to the musical notes characteristic of the room, and in small rooms lined with tile or hard plaster this resonance is particularly evident.

ELECTRICITY

Electric Piano Has Keyboard But Lacks Strings

PRODUCTION has started in Kalamazoo, Mich., on a piano with no strings. Instead of having lengths of wire to produce the tones, short slivers of steel only a few inches long are vibrated by electricity.

The new instrument, called a clavier, uses a piano keyboard to actuate tone production, in which the note produced is 90 per cent. fundamental and only 10 per cent. overtones, just the opposite of an ordinary piano. Tones are produced by plucking a steel bar which has been properly grooved. The almost inaudible tone is picked up by magnetic induction and passed through an audio-frequency amplifier.

The amplifier unit is specially designed, having a capacity of 30 watts, as contrasted to the two or three watts of the average radio amplifier. Thus the player has at command a tone ranging from a mere whisper to one balancing an orchestra, with little distortion or dilution. In the instrument the impact noise, sometimes audible in a piano, is filtered out, producing what is said to be pure tones, capable of blending with other tones.

The piano was developed by Prof. Lloyd Loar after eight years' experimentation. He was an early experimenter in amplification of tones through electrical means.

It is said that through use of ear phones the piano student may practice his lessons without disturbing anyone, tones being heard only by him. A turn of a dial enlarges the tone capacity, if desired. The piano of the future, employing the tuned sliver-of-steel method, will consist of little more than the keyboard, as the piano movement occupies only a few inches of space.

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CHEMISTRY

Pure Vitamin Obtained In Quantity Now

A METHOD for obtaining pure vitamin B₁₂ in large quantities has been developed by Drs. R. R. Williams and Walter H. Eddy, Teachers College, Columbia University. Chemical details of the method are given in a report to the Carnegie Institution of Washington just made public.

By this new method, which is still in



500,000 WATTS

This power, ten times that of the largest American broadcasting stations today, will be radiated from experimental transmitter W8XO nearing completion by the Crosley Radio Corp. at Mason, Ohio. A new 831-foot vertical radiator type antenna is shown towering above the plant. The new transmitter, a bold step toward "super-power" broadcasting, will first operate on test from 1 a. m. to 6 a. m. and is later expected to transmit broadcasts regularly.

process of improvement, yields of from 250 to 300 milligrams of vitamin in crystalline form have been obtained from 50 kilograms of rice polish. While this amount seems very small when considered in terms of large scale production of ordinary substance, since 100 milligrams is only one and one-half grains, roughly, and 50 kilograms is over 100 pounds, it represents from five to fifteen times the yield obtained heretofore by other investigators.

Lack of this vitamin causes nervous disorders, among them beri-beri. While the amounts necessary for health can be added to the diet by ordinary foods as whole grain cereals, chemists need to have rather large supplies of it in crystalline form for further investigations as to its chemical composition and effects on the body. Drs. Williams and Eddy hope that by their method, several steps of which have been carried out on a large scale according to a factory type of operation, they will be able to make the vitamin available in quantities of several grams.

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BIOCHEMISTRY

Men Are Walking Drugshops, Dr. Abel Declares in Address

From Human Organs, Pharmacist Can Prepare Arrow Poisons That Would Have Delighted Primitive Warriors

"**W**E OURSELVES are walking drug shops. An experienced chemist or pharmacist would have no difficulty in preparing arrow poisons from some of our own organs that would have delighted the heart of primitive man."

These perhaps surprising statements were among the many facts about poisons that Dr. John Jacob Abel, emeritus professor of pharmacology at the Johns Hopkins Medical School, told members of the American Association for the Advancement of Science in his address as retiring president.

Dr. Abel emphasized the chemical nature of disease, saying that most bacteriologists now believe all infectious diseases are really poisonings. For some diseases such as diphtheria and lockjaw, this has been proved. It is known that these diseases are caused by a poison produced by the "germs" or bacteria. In other diseases, medical scientists suspect that the disease is really a poisoning from some substance produced by the "germs," even though they have as yet no proof for this belief.

The first physiological or pharmacological experiment made by man was probably the smearing of arrows and spear heads with poisons, he said.

"Stinging insects and venomous serpents were no doubt the first among animal forms to invent hypodermic injections, a procedure which was introduced into medical practice only in the years 1845 to 1856," he continued.

The poisons which these insects and snakes produce were not developed solely for self-protection, however. The snake's venom is indispensable to its health, besides containing ferments necessary for its digestive processes. Similarly, the poisons of bees and wasps appear to aid in the development of their eggs after they have been fixed on them.

"Nature has not affixed a poison label to any particular substance or class of substances," Dr. Abel said. "The pharmacist does that."

Among the substances in man's own body which may be poisonous in certain doses are insulin, which controls sugar utilization and is necessary for life and health; adrenaline or epinephrine produced by the adrenal glands and a valuable medicine in certain conditions of diseases; and the hormone produced by the parathyroid glands, excessive amounts of which cause calcium to be removed from the bones at such a rate that they soon cannot support the weight of the body, besides causing other conditions leading to death.

Vitamins, which Dr. Abel characterized as plant hormones, are also poisonous in large doses, although necessary to life in certain amounts.

"From the wider biological view, we should not think of poisons as being inherently more malevolent than any of the other agents or influences of our environment to which we are constantly exposed," Dr. Abel stated. "I incline to the belief that no living cell exists whose contents or metabolites are not toxic to some other living cell."

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ARCHAEOLOGY

Saul's Fortress-Palace Found At Gibeah

ARCHAEOLOGISTS have at last identified the fortress of King Saul, the walled capital from which the Bible hero went out time and again with his soldiers to wage war against the enemies of Israel. Success in identifying the ruins of Saul's palace-fortress is reported by Prof. W. F. Albright, director of the American School of Oriental Research in Jerusalem.

The site is known today as Tell el-Ful. Prof. Albright began excavating there twelve years ago. But his work was interrupted before the history of the fortress could be traced. That the site was really Gibeah, the capital of King Saul, has long been accepted as presumably true. But like most Bible sites, this one had a number of stages

in its career. It remained for archaeologists to probe through the layers of broken walls and debris, and to find the walled capital of Israel's first king.

The excavations reveal that a village of about the twelfth century B.C. first stood on the hill. Traces of fire which destroyed this village can be seen, thus confirming the Bible record of the tragedy that befell Gibeah, as told in the Book of Judges. In the eleventh century, King Saul's royal fortress rose on the hill. And after its destruction, other settlements followed on the site.

A problem which beset archaeologists was that the fortress seemed small, considering its status and the retinue of the king. But this discrepancy is now cleared up. What was thought to be the king's citadel turns out to be merely the corner tower. The entire fortress was at least 170 feet long and 115 wide.

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lief in the necessity of its use. Hunger is lacking and the material to feed it is not accessible. But appetite grows with eating. The trouble with much of what is called the popularization of knowledge, is that it is content to diffuse information, in diluted form, merely as information. It needs to be organized and presented in its bearing upon action. Here is a most significant phase of the obligation incumbent upon the scientifically trained men and women of our age. When there is the same energy displayed in applying knowledge to large human problems as there is today in applying it in physical inventions and in industry and commerce, many of our present problems will be well on their way to solution. . . .

James McKeen Cattell is himself an active scientific worker, one who has initiated in his own field of psychology many movements that have borne rich fruit. But he has found time, thought and energy to devote to the larger questions of the bearing of science upon life. He has given himself without stint to the better organization of scientific workers in all fields, to the improvement of the condition of academic workers to the task of editing and diffusing the achievements of scientific inquiry. I do not need to press home the moral in connection with the intellectual obligation of which I have spoken. Laboring of the point is unnecessary as long as we have Cattell with us.

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ARCHAEOLOGY

Genealogy of First Family Of America Traced to 1400

SOCIETY leaders and many other people in America who take a keen interest in titled families have probably never heard of the Xiu family. But they should. For the Xiu have the oldest known family tree of the American nobility surviving today. Their genealogical record has been traced back unbroken to 1400 A.D., on American soil.

Members of the Xiu family who live in Yucatan are descendants of a great line of Indian rulers that governed for more than five centuries. These ancestors played star roles in America's greatest ancient civilization. Such were the flower of Indian nobility for whom skilful craftsmen made gold and jade jewelry and featherwork head dresses. They were leaders in the procession and public events.

Now, the Carnegie Institution of Washington has undertaken to bring together as much of their genealogical record as can be traced in ancient documents and in interviews with living members of the family. The evidence is chiefly in a collection of the Xiu family documents in the Peabody Museum at Harvard. There are also unpublished documents in libraries at Tulane University and the University of Pennsylvania which shed light on the career of the distinguished old family.

The Xiu papers present an unbroken history of this famous family from about 1400 A.D. until 1817. Ralph Roys, of the Carnegie Institution of Washington, writing in that institution's annual report, rates this as a unique record. Not even the lineage of the Aztec Montezumas or the ruling Incas of Peru can be traced in this manner.

With the fall of the Spanish regime in Yucatan, the family papers end, and the scientific investigator made a trip to Yucatan to search more recent church and government documents and to interview numerous members of the family.

Practically all the living Xiu who could be located were traced back to ancestors listed in the 1817 patent of nobility.

Like many another noble family, their life has become hard. After ruling for

more than five centuries, and then being privileged nobles for another 280 years, the Xiu for more than a century have earned their bread by hard work.

As one observation of genetic interest, Mr. Roys comments:

"The direct descendants of the last noble head of the family have not done particularly well during their century of economic struggle, for they are less prosperous and show a higher rate of infant mortality than the collateral family groups which were the subjects of this study."

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CHEMISTRY

Cotton Tried As Binder In Asphalt Paving Blocks

COTTON was used as a reinforcing material in making asphalt paving blocks exhibited at a lecture before a Washington audience of the noted Negro chemist, Prof. George W. Carver, who has built up a wide reputation through his life-long researches on new uses for the agricultural products of the South. About 31½ per cent. of the blocks, by weight, consisted of cotton; the reinforcement, Prof. Carver stated, increases their strength and resistance to wear. "Roads made of these blocks would use up forty bales of cotton to the mile," he said. "That should dispose of a lot of our surplus cotton."

Prof. Carver fascinated his audience by fishing up out of a capacious bag samples of an endless array of products, ranging from a dozen kinds of milk and cream to hair tonic and wall paper, all made by chemical manipulation of peanuts. He has made hundreds of synthetic products from these humble vegetables, as well as many more from sweet potatoes and other unpromising materials, some of which have come into commercial use. Being completely indifferent to money himself, Prof. Carver has not profited personally by the exploitation of any of his chemical inventions.

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Statistics show that more schoolboys die from accidents than from all the usual communicable diseases combined.



ZOOLOGY



Early Americans

WHenever you spend a nickel you pass over the counter a little medallion commemorating two bred-in-the-bone Americans; on one side an Indian and on the other a buffalo, or more strictly speaking, a bison. It is highly appropriate that these two Early Americans should be thus recognized on what is the most thoroughly American of coins—though it is rather a pity that their images could not have been on the more colorful bronze.

The bison should not be called a buffalo, for that name by right belongs to the smooth-hided, long-horned beasts of the warmer parts of the Old World, from the Cape buffalo of South Africa to the carabao of the Philippines. But the bison has been so named for so long, and the name so fixed by the immense vogue of that old frontiersman and showman of a former generation. Buffalo Bill, that it is unlikely that the error will ever be corrected.

Although the bison is so thoroughly American he was, like many other Americans, even the American Indians, an immigrant from the Old World. The great Eurasian continent was the original home of both bison and Indian, and they came here by the same route, the old land bridge that once united Asia and Alaska.

Until the World War there used to be a few hundred survivors of the Old World bison species, mainly in the Baltic region and in the Caucasus mountains. In classic times and during the middle ages the European bison, or wisent, was very common. But even the few survivors were wiped out during the war and the revolutionary disturbances that followed, so that now there are only about a few score wisent left alive.

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MEDICINE

Lack of Vitamin Balance Seen as Cause of Pellagra

PELLAGRA, sometimes known as the "hard times" disease of the Southern states, is caused not so much by too little vitamin B₂ (or vitamin G) in the diet as by a combination of too little of this vitamin with too much of vitamin B₁. Experiments showing this to be the case have been reported to *Science* by Dr. Walter H. Eddy and his associate, Minerva Kellogg, of Teachers College, Columbia University.

From these experiments may come a settlement of the lively and long-continued controversy among scientists as to the cause of pellagra.

The late Dr. Joseph Goldberger of the U. S. Public Health Service showed that pellagra was due to inadequate diet and that feeding yeast or other substances rich in vitamin B₂ cured the condition. However, not all scientists agreed with his theory that the disease was caused by lack of this factor.

Yellow Corn Eaters Diseased

Chief argument against the Goldberger theory was the fact that there is a great deal of pellagra occurring among people living on maize or yellow corn. Until the Goldberger investigations, the disease was regarded as a food poisoning and attributed to the use of maize or Indian corn as food.

The suggestion leading to the Eddy-Kellogg experiments was apparently first made by the distinguished English

biochemist, Prof. E. Mellanby. His investigations into poisonous factors in cereals led him to suggest that maize may contain a poison which may be the cause of pellagra but may be prevented from exercising its pellagra-producing capacity by the presence of a protective agent in the nature of a vitamin or possibly two vitamins, B₂ and A.

Tested on Animals

Dr. Eddy and Miss Kellogg fed animals in one series diets containing a constant, normal amount of vitamin B₁, with the amount of B₂ varied from subminimal to high. In another series, they fed the animals a diet in which the amount of B₂ was constant and normal, while the amount of B₁ varied from subminimal to high. They found that when the B₂ (also known as vitamin G and the pellagra-preventing factor) was low or subminimal and the B₁ (found in maize and other cereals) was adequate or high, pellagra developed more uniformly in practically all cases.

"These experiments would explain the appearance of pellagra on a diet of maize or any other of the whole cereals," the Columbia investigators reported. "They are rich in B₁ and low in B₂, and a continuous diet of such cereals supplemented with other foods containing little or no B₂ would produce pellagra if compatible with the theory."

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General Science

A HISTORY OF THE NATIONAL RESEARCH COUNCIL, 1919-1933—*National Research Council*, 61 p., 50c. "A partial record of the accomplishments of the National Research Council" is set forth in this pamphlet. Organized to mobilize the scientific and technical resources of the country during the World War, this important agency has since then undertaken many peacetime tasks for science. The Council administers funds amounting in recent years to about \$800,000 a year for special research purposes. Besides these funds used as research fellowships, grants, and other financial aids, the Council sponsors a variety of enterprises which require other forms of assistance. Its divisions of special sciences, aiming always not to duplicate work of other organizations, fill in many gaps, and pioneer in neglected fields, working widely through committees and conferences.

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Ethnology

THE COCOPA—E. W. Gifford—*Univ. of California Press*, 77 p., 7 pl., \$1. An ethnological study of a branch of the Yuman family living in the valley of the Rio Colorado. The author has very sensibly reduced his material to its lowest terms presenting the facts in almost notebook fashion, under orderly headings and sub-heads. This method produces a decidedly handy reference work.

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Economics

UTILIZATION AND COST OF POWER ON CORN BELT FARMS—L. A. Reynoldson and others—*Govt. Print. Off.* 60 p., 5c.

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Sociology

THE COMMUNITY INDUSTRIES OF THE SHAKERS—Edward D. Andrews—*Univ. of the State of New York*, 322 p., 40c. New York State Museum Handbook No. 15.

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Ethnology

AN OUTLINE OF DAHOMEAN RELIGIOUS BELIEF—Melville J. Herskovits and Frances S. Herskovits—*American Anthropological Assn.*, 77 p., 85c. In this memoir, two authors attack a difficult subject of investigation bravely, and with good success. The complexity of religious ideas of the Dahomey Negroes is well known. This ethnologi-

cal study shows how the Dahomey universe is peopled with humans, deities, ancestral spirits, and familiar spirits, and how they all "get along together" in the life of West Africa.

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Zoology-Photography

THE SECOND PICTURE BOOK OF ANIMALS—"Das Tier"—*Macmillan*, 120 p., \$2.50. A collection of photographically splendid and appealing pictures of animals, young and full-grown, wild and domestic. These are presented with "not many words about them" for the boys and girls of America by the German magazine "Das Tier," but we can promise that their elders will find equal enjoyment in this rare collection.

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Psychology

STUDIES IN THE PSYCHOLOGY OF ART—Edited by Christian A. Ruckmick—*Psychological Review Co.*, 188 p., \$2.75. Containing the reports of eleven investigations conducted under the direction of Norman C. Meier in the psychological laboratories of the University of Iowa. Study of the artistic appreciation of children, their imagination, creative ability, is revealing much regarding the development of artistic talent. This group report, issued as one of the Psychological Monographs, is illustrated in color.

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Physics

PSYCHROMETRIC CHARTS—Donald B. Brooks—*Govt. Print. Off.* 5c.

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Paleontology

TERTIARY LARGER FORAMINIFERA OF VENEZUELA—D. W. Gravell—*Smithsonian Institution*, 44 p., 6 pl., 20c.

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Geology

GUIDE TO THE GEOLOGY OF JOHN BOYD THACHER PARK (INDIAN LADDER REGION) AND VICINITY—Winifred Goldring—*Univ. of the State of New York*, 112 p., 3 folded charts, 30c. New York State Museum Handbook No. 14.

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Penology

HANDBOOK OF AMERICAN PRISONS AND REFORMATORIES, 1933—Edited by W. B. Cox, F. L. Bixby, and W. T. Root—*Osborne Assn.*, 1076 p., \$2.50. This new edition of the handbook gives an individual survey of each of our correctional institutions based on personal visits of at least two representatives of the Association. In general, tendencies are toward what is now thought of as the ideal for such institutions; standards for personnel in prisons are being raised, medical and educational services are gradually improving, individual study of prisoners' needs is increasing and the principle of parole is being extended. The tendency to limit prison labor is, however, presenting a serious problem to administrators since "depriving prisoners of a chance to work not only adds greatly to the cost of maintaining penal institutions and destroys one of the most effective agencies of rehabilitation, but it also increases the likelihood of riots with their attendant property destruction and loss of life."

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Ethnology

HOPÍ AND ZUNI CEREMONIALISM—Elsie Clews Parsons—*American Anthropological Assn.*, 108 p., \$1.10. A comparison of rites and ceremonies in two Pueblo Indian groups. Dr. Parsons has not merely presented new data from her notebooks, but has correlated this information with material that has heretofore appeared scattered through other publications.

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Physics

GENERAL PHYSICS—J. Joseph Lynch, S.J.—*Fordham Univ.*, 254 p., \$2. The book is intended as a set of lecture notes rather than as a textbook—an X-ray picture of the general physics course given at Fordham to meet the requirements of Medical School entrance.

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Standards

PAPER (BASIC SHEET SIZES)—Bureau of Standards—*Govt. Print. Off.*, 17 p., 5c. Second edition.

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